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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

SONYJP-097

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/646589

INTERNATIONAL APPLICATION NO.

PCT/JP00/00290

INTERNATIONAL FILING DATES

January 21, 2000

PRIORITY DATE CLAIMED

January 21, 1999

TITLE OF INVENTION DATA PROCESSING DEVICE AND DATA PROCESSING METHOD

APPLICANT(S)

FOR DO/EO/US

Takeo MORINAGA et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371 (f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371 (b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371 (c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☒ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). **(Executed)**
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98, with PTO-1449, 2 references
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 & 3.31 is included.
13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

First Page of International Application as published
Three (3) Sheets of Formal Drawings

Form PTO-1390 (Rev 10-96)

Page 1 of 2

EXPRESS MAIL LABEL NO. _____

DATE: September 19, 2000

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430 Rec'd PCT/PTO 19 SEP 2000

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) **09/646589** INTERNATIONAL APPLICATION NO. PCT/JP00/00290 ATTORNEY'S DOCKET NUMBER SONYJP-097

17. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$970.00
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$840.00
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$690.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$670.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$96.00

CALCULATIONS PTO USE ONLY

ENTER APPROPRIATE BASIC FEE AMOUNT =

840.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	6 - 20 =	0	x \$18.00
Independent claims	2 - 3 =	0	x \$78.00
MULTIPLE DEPENDENT CLAIM(s) (if applicable)			+ \$260.00

TOTAL OF ABOVE CALCULATIONS =

840.00

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).

SUBTOTAL =

840.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +

TOTAL NATIONAL FEE =

840.00

Fee for recording the enclosed assignment (37 CFR 1.21 (h)). Assignment must be accompanied by appropriate cover sheet (37 CFR 3.28, 3.31) + (\$40.00 per property).

TOTAL FEES ENCLOSED =

840.00

Amount to be:

Refunded

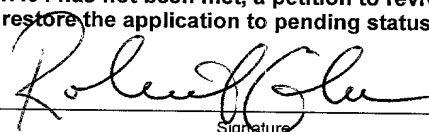
Charged

- a. ☐ A check in the amount of _____ to cover the above fees is enclosed.
- b. ☒ Please charge my Deposit Account No. 12-1095 in the amount of \$840.00 to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to my Deposit Account No. 12-1095. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Registration Number

09646589.09.00

3/ppts

09/646589
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DESCRIPTION

DATA PROCESSING APPARATUS AND DATA PROCESSING METHOD

Technical Field

The present invention relates to a data processing apparatus and data processing method, and suitably applied to such as an IRD (integrated receiver decoder) for the DVB (digital video broadcast).

Background Art

Heretofore, in this type of digital broadcasting system, after the video data and audio data of plural channels are compression-coded by using the MPEG2 (moving picture experts group phase 2), these data are packetized per the predetermined unit (such as 184 [byte]) (hereinafter, the resultant packets are referred to as TS (transport stream) packets) and multiplexed, to form a transport stream which is then transmitted via terrestrial wave, satellite wave or cable as the digital broadcasting signal.

In such digital broadcasting system, a receiving apparatus extracts TS packets corresponding to a desired channel from among the TS packets contained in the transport stream received as a digital broadcasting signal, and decodes them to the video data and audio data in the original signal format according to the reverse procedure to the compression processing.

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In recent years, such a receiving apparatus has plural output terminals for digital signals as output terminals for external connection (hereinafter referred to as digital output terminal). This allows audio data obtained by the aforementioned decoding, after being converted into a predetermined format, to be output to an external apparatus via an optical digital audio output terminal of IEC (International Electro-Technical Committee) 958 format, or to be output to an external apparatus via a high-speed serial interface called IEE (institute of electrical and electronics engineers) 1394, or allows the transport stream before decoding itself to be output to an external apparatus.

Since degradation in image quality and sound quality does not occur in such digitalized video data and audio data, a digital recording apparatus can dub data unlimited number of times without degradation in quality.

Therefore, in general, by transmitting video data and audio data after adding predetermined copy control data (CCI: copy control information) at the transmitting end, copy is restricted based on the copy control data at the digital receiving end, and thus, unlawful dubbing infringing the copyright can be prevented.

According to the SCMS (serial copy management system) adopted in the IEC 958, this copy control data has three types of information: "never copy", "copy once", and "copy free". More specifically, "never copy" represents that copy is not allowed, "copy once" represents that copy is allowed only once (after copy

once, the information shifts to "never copy"), and "free copy" represents that copy is allowed unlimited number of times. In the aforementioned digital broadcasting system, such copy control data is added to each program and is transmitted to prevent unlawful dubbing infringing the copyright.

However, considering that digital broadcasting signal with copy control data "copy once" is received by the aforementioned receiving apparatus having plural digital output terminals and recorded in a digital recording apparatus, the digital signal is output from the plural digital output terminals at the same time. Therefore, even if copy is allowed only once, plural copies are made by connecting each digital output terminal to a digital recording apparatus.

In addition, in practice, it has been quite difficult for the receiving apparatus equipped with plural digital output terminals to use new application that limits the number of copies such as pay-per-download.

Disclosure of the Invention

The present invention has been done considering the above point and is proposing a data processing apparatus and data processing method capable of conducting the copy control without fail.

To obviate such problems, in the present invention, we provide plural output terminals for transmitting digital data to

which the predetermined control data to be supplied is attached, and a control means for controlling the output of each output terminal so as to output digital data via only one specified output terminal out of the plural output terminals according to the contents of copy restriction based on the control data.

As a result, in this data processing apparatus, when the copy restriction exists in the control data, the digital data can be prevented from being output via the plural output terminals.

Furthermore, according to the present invention, in the case of outputting digital data to which the predetermined control data to be supplied is attached via plural output systems, each output system is controlled according to the contents of copy restriction in the control data, so as to output the digital data via only one output system out of the plural output systems.

As a result, according to this data processing method, when the copy restriction exists in the control data, digital data can be prevented from being output via the plural output systems.

Brief Description of the Drawings

Fig. 1 is a schematic diagram showing the construction of a digital broadcasting system according to the embodiment of the present invention.

Fig. 2 is a block diagram showing the construction of a receiving apparatus according to the embodiment of the present invention.

Best Mode for Carrying Out the Invention

With reference to the accompanying figures one embodiment of the present invention will be described. Note that, the following description is made using an EMD (electric music distribution) adopting the digital broadcasting system and this invention is applicable not only to the EMD but also to movie distribution service.

In Fig. 1, numeral 1 generally shows a digital broadcasting system 1 according to the present invention. At the transmitting apparatus 2, music data for plural channels to be provided are compression-encoded using the MPEG2 system and then, the resultants are TS-packetized per the predetermined unit and multiplexed, so as to form a transport stream. In addition, in this digital broadcasting system, not only the music distribution service but also video and audio data of programs such as a film and a drama can be compression-coded using the MPEG system and transport streams are formed. Thus formed plural transport streams are frequency-multiplexed and transmitted.

At this point, this transmitting apparatus 2 inserts a TS packet storing copy control data in a predetermined format into the transport stream for the music distribution service. This copy control data are classified under the first level that prohibits copy, the second level that allows copy once, and the third level that allows copy freely.

That is, programs which are transmitted in digital satellite broadcasting include copyright information so as to prevent unlawful copy infringing copyright. And in a PMT (program map table) of a transport stream, the copyright information which relates to the service is inserted by being added to the contents, as two descriptor, DM_copy_control_descriptor and digital_copy_control_descriptor.

The descriptor called DM_copy_control_descriptor includes information on analog video output, such as trigger information for analog copy guard. In addition, pay-per-tape (service to charge every time when recording on a recording medium such as a magnetic tape) information is also included. When a user records contents which is the pay-per-tape, he should ask and pay additional fee to release the analog copy guard. If he does not ask, the analog copy guard is not released.

The descriptor called digital_copy_control_descriptor includes CGMS (copy generation management system) information which is the same as the aforementioned SCMS and the digital output is controlled according to this information.

The CGMS is copyright information represented by two bits. This two bits means as follows:

- "00" shows that copy is allowed freely.
- "01" shows that copy is not allowed in CGMS.
- "10" shows that copy is allowed only once.
- "11" shows that copy is never allowed.

In this invention, outputs from the plural digital output terminals are controlled according to the contents of descriptor called the digital_copy_control_descriptor.

In this way, the transmitting apparatus 2 transmits a digital broadcasting signal S1 consists of thus frequency-multiplexed transport stream via a communication satellite (CS) 3, and the transmitted digital broadcasting signal is supplied to a receiving apparatus 5 via an antenna 4.

The receiving apparatus 5 selects a desired frequency from the received digital broadcasting signal, extracts the TS packets having the audio data of a desired tune from the transport streams transmitted at the selected channel, and decodes the audio data stored in these TS packets for transmission to a speaker 6 and also for output to digital recording apparatuses 7, 8 such as a MD (mini disc) recorder via a digital output terminal (not shown) as required.

In practice, the receiving apparatus 5 is constructed as shown in Fig. 2. A front-end unit 10, receiving the digital broadcasting signal S1 via the antenna 4, tunes a frequency (frequency assigned to a transponder loaded on the communication satellite 3) based on a channel specification command S2 transmitted from a control unit 11. Then, it performs, for example, QPSK (quadrature phase shift keying) demodulation and error correction processing and outputs a transport stream D1 having the coded data of the desired program.

Then, a descrambler 12 sequentially descrambles the encrypted TS packets using a decryption signal S3 which is obtained from the control unit 11, and transmits the descrambled transport stream D2 to a demultiplexer 13.

The demultiplexer 13, receiving a control signal S4 corresponding to a program specified by the user from the control unit 11, extracts TS packets D3 having the audio data of the specified program and a TS packet D4 having the copy control data, and transmits the TS packets D3 to an audio decoder 14 and also the TS packet D4 to the control unit 11. Note that, in the case where the selected program is a film, drama, or news, TS packets having video data are also extracted and supplied to a video decoder not shown.

The audio decoder 14, after decoding the audio data included in the extracted TS packets, transmits this to a D/A (digital/analog) converter 15, an input terminal 16A of a switch 16 and an input terminal 17A of a switch 17, according to a control signal S5 which is obtained from the control unit 15.

The D/A converter 15, after converting the resultant audio data D5 to analog data, transmits this to the externally connected speaker 6 (Fig. 1) via an analog output terminal 18 as an analog audio signal S6. As a result, the speaker gives sound based on this analog audio signal S6.

On the other hand, the control unit 11 extracts copy control data D_{cc1} included in the supplied TS packet D4, judges if the copy

control data D_{cc1} belongs to the first level that prohibits copy, or the second level that allows copy only once, or the third level that allows copy freely, and transmits switch signals S7 and S8 to the switches 16 and 17 respectively according to the judgment result.

In this time, only when the control unit 11 judges that the decoded copy control data D_{cc1} is the third level, the control unit 11 connects switches 16 and 17 to ON conditions. On the other hand, when it judges the copy control data D_{cc1} is the first or the second level, it connects either the switch 16 or 17 specified by the user to ON condition.

At the time when the switch 16 is ON condition and the switch 17 is OFF condition, the audio data D5 supplied from the audio decoder 14 is supplied to a first format processing unit 19. This first format processing unit 19, after converting the audio data D5 to the predetermined format according to the IEC958 for example, transmits this to a first information adding unit 21 as first audio data D6.

This first information adding unit 21, after adding the copy control data D_{cc1} to the first audio data D6, transmits this to the externally connected digital recording equipment 7 (Fig. 1) via a digital output terminal 22.

On the other hand, in the case where the switch 16 is OFF condition while the switch 17 is ON condition, the audio data D5 supplied from the audio decoder 14 is given to the second format

processing unit 20. This second format processing unit 20, after converting the audio data D5 to the predetermined format according to such as the IEEE1394, transmits this to a second information adding unit 23 as the second audio data D7.

This second information adding unit 23, as well as adding the copy control data D_{cc1} to the second audio data D7, applies the encryption processing to the second audio data D7 only when the copy control data D_{cc1} shows the first or the second level. And then, it transmits this to the externally connected digital recording apparatus 8 (Fig. 1) via the digital output terminal 24. This encryption processing is based on the standard called 5CDTCP and is to protect copyright at the time of transmitting digital content data such as audio and video in the IEEE1394.

In this way, the first or the second audio data D6 or D7 to which the copy control data D_{cc1} is attached is supplied to either digital recording apparatus 7 or 8 which is specified by the user. Thus, in the digital recording apparatus 7 or 8, the first or the second audio data D6 or D7 can be recorded on the predetermined recording medium (not shown in Fig.) under the condition in which copy restriction is imposed in the form of the level of the copy control data D_{cc1} .

According to the construction described above, in this receiving apparatus 5, when the audio data D5 of a program specified by the user is not allowed to be copied or is allowed to be copied only once according to the copy control data D_{cc1} , the

first or the second audio data D6 or D7 is transmitted to either the digital output terminal 22 or 24 which is specified by the user out of two digital output terminals 22 and 24.

Accordingly, the receiving apparatus 5 can supply the first or the second audio data D6 or D7 to which the copy control data D_{cc1} is added, to either digital recording apparatus 7 or 8 which is specified by the user. As a result, in the digital recording apparatus 7 or 8, copy restriction based on the copy control data D_{cc1} can be imposed.

According to the foregoing construction, in this receiving apparatus 5, only when the copy restriction based on the copy control data D_{cc1} exists, the audio data D5 (D6, D7) is output together with the copy control data D_{cc1} to either digital output terminal 22 or 24 which is specified by the user. Therefore, copy restriction can be imposed at the digital recording apparatus 7 or 8 connected to the digital output terminal 22 or 24. And thereby the execution of unlimited dubbing can be avoided in advance.

Note that, the embodiment described above has dealt with the case of converting the audio data D5 (D6, D7) to which the predetermined copy control data D_{cc1} to be supplied is added, into plural formats (formats corresponding to interface of the IEC958 and IEEE1394) and outputting them. However, the present invention is not only limited to this but also these may be converted into the format corresponding to the interface which is used in various other digital data.

Further, the embodiment described above has dealt with the case of applying the audio data D5 as the digital data to be supplied. However, the present invention is not only limited to this but also it can be widely applied to various digital data such as digitalized video data.

Furthermore, the embodiment described above has dealt with the case of applying the digital output terminal 22 based on the IEC958 and the digital output terminal 24 based on the IEEE1394 as the plural output terminals for outputting the supplied audio data D5. However, the present invention is not only limited to this but also plural digital output terminals based on the IEC958 can be provided in the receiving apparatus and also, plural digital output terminals based on the IEEE1394 can be provided.

Furthermore, the embodiment described above has dealt with the case of applying the control unit 11 as the control means for controlling output of each output terminal according to the contents of copy restriction based on the copy control data D_{cc1}. However, the present invention is not only limited to this but also, in short, provided that the audio data D5 (D6, D7) can be output via only one digital output terminal 22 or 24 which is specified out of the plural digital output terminals 22 and 24 when it is judged that the copy restriction is imposed, control means having various other constructions can be used as the control means.

In this case, as a method to specify a digital output

terminal alternatively, the first format processing unit or the second format processing unit can be stopped, in addition to the case where the switches 16 and 17 are switched so that one of them is switched ON.

Furthermore, in the aforementioned embodiment, the copy restriction based on the copy control data D_{cc1} is classified into three: the first level that prohibits copy; the second level that allows copy once; and the three level that allows copy freely. However, the present invention is not limited thereto and a level that allows copy plural number of times (twice or more) can be provided between the second level and the third level.

Furthermore, the embodiment described above has dealt with the case of applying the data processing apparatus according to the present invention to the digital CS broadcasting using the communication satellite 3. However, the present invention is not only limited to this but also it can be widely applied to various broadcasting systems such as the digital terrestrial wave broadcasting and CATV (cable television) broadcasting.

Furthermore, the embodiment described above has dealt with the case of applying the MD recorders as the digital recording apparatus 7, 8 connected to the digital output terminals 22, 24 provided in the receiving apparatus 5. However, the present invention is not only limited to this but also it can be widely applied to the recording apparatus capable of recording various digital data such as a rewritable optical disc apparatus and

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digital VTR.

According to the present invention as described above, since the control means for controlling the output of each output terminal in order to output digital data only via one specified output terminal out of plural output terminals according to the contents of the copy restriction based on the control data is provided, the digital data can be prevented from being output via plural output terminals when the control data shows the copy restriction. And thus, a data processing apparatus capable of conducting the data control certainly can be realized.

Furthermore, according to the present invention, in the data processing method, by controlling each output system in order to output the digital data via only one specified output system out of plural output systems according to the contents of the copy restriction based on the control data, the digital data is prevented from being output via plural output systems when the control data shows any copy restriction. And thereby, the data processing method capable of conducting the data control certainly can be realized.

Industrial Applicability

The present invention is utilized for a data processing apparatus and data processing method which are to externally output digital data with predetermined control data to be supplied via plural output systems.

Claims

1. A data processing apparatus comprising:
plural output terminals for outputting digital data to which predetermined control data to be supplied is added; and
control means for controlling output of each said output terminal in order to output said digital data via only one specified output terminal from among said plural output terminals according to the contents of copy restriction based on said control data.
2. The data processing apparatus according to Claim 1, wherein said control means adds the predetermined control data to said digital data to be output via only said one specified output terminal.
3. The data processing apparatus according to Claim 1, wherein the contents of said copy restriction shows that copy is prohibited, or copy is allowed only once.
4. A data processing method, wherein
in the case of externally outputting digital data to which predetermined control data to be supplied is added, via plural output systems, said output systems are controlled in order to output said digital data via only one specified output system out of said plural output systems according to the contents of copy

restriction based on said control data.

5. The data processing method according to Claim 4, wherein said control means adds predetermined control data to said digital data to be output via only said one specified output terminal.

6. The data processing method according to Claim 4, wherein the contents of said copy restriction show that copy is prohibited, or copy is allowed only once.

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ABSTRACT

In a data processing apparatus and data processing method, each output system is controlled according to the contents of copy restriction based on control data so as to output digital data via one output system which is specified out of plural output systems. Therefore, when the control data show the copy restriction, digital data is previously prevented from being output via the plural output systems. As a result, a data processing apparatus and data processing method capable of conducting data control without fail are realized.

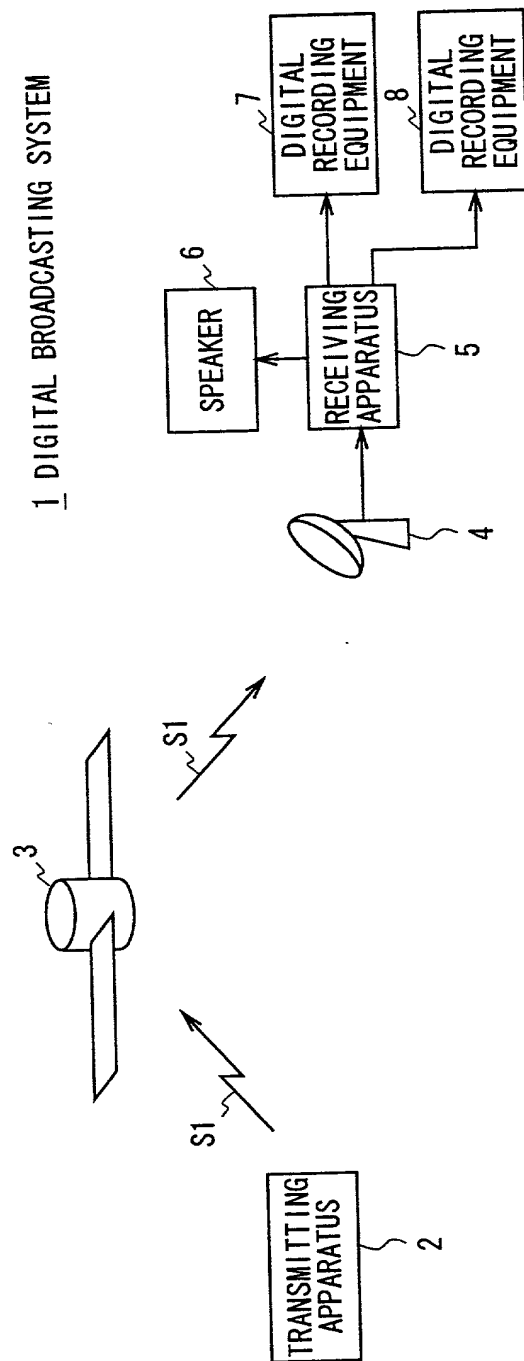


FIG. 1

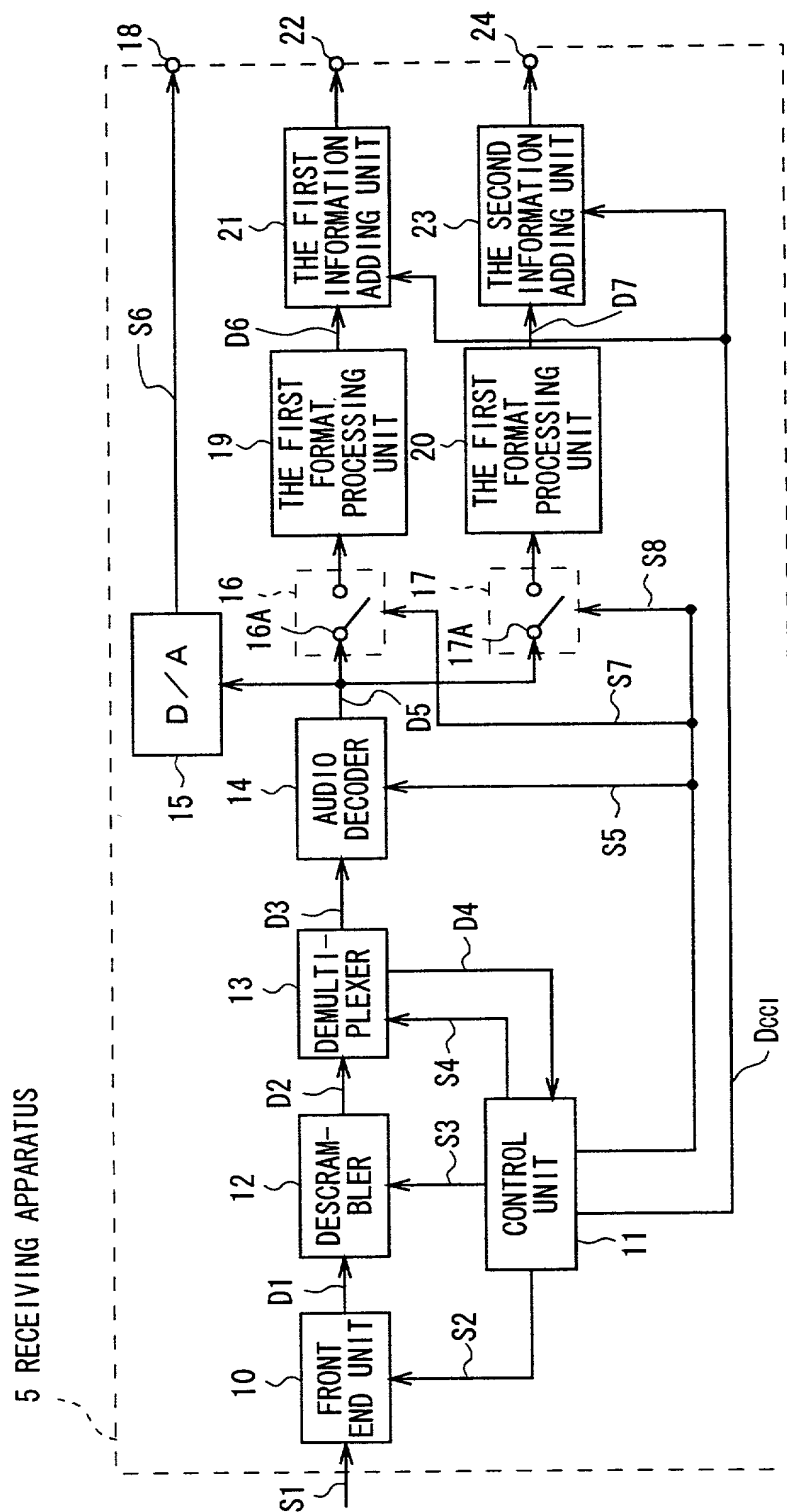


FIG. 2

Description of Reference Numerals

1... .. digital broadcasting system, 2... .. transmitting apparatus, 3... .. communication satellite, 4... .. antenna, 5... .. receiving apparatus, 6... .. speaker, 7, 8... .. digital recording apparatus, 10... .. front end unit, 11... .. CPU, 12... .. descrambler, 13... .. demultiplexer, 14... .. audio decoder, 16, 17... .. switch, 19... .. first format processing unit, 20... .. second format processing unit, 21... .. first information adding unit, 23... .. second information adding unit, D_{cc1}... .. copy control data

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION

ATTORNEY'S DOCKET NO.: SONYJP 3.3-097
SONY REFERENCE NO.: S00P0071US00

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DATA PROCESSING DEVICE AND DATA PROCESSING METHOD the specification of which

☐ is attached hereto

☒ was filed on **January 21, 2000** as United States Application Number or PCT International Application Number **PCT/JP00/00290** and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (month, day, year)	PRIORITY CLAIMED
Japan	P11-013417	January 21, 1999	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
			YES <input type="checkbox"/> NO <input type="checkbox"/>
			YES <input type="checkbox"/> NO <input type="checkbox"/>

LISTING OF FOREIGN APPLICATIONS CONTINUED ON PAGE 3 HEREOF ☐ YES ☒ NO

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

Application Number:

Filing Date:

Application Number:

Filing Date:

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Parent Application Serial Number:

Parent Patent No.:

Parent Filing Date:

U.S. Parent Application Serial Number:

Parent Patent No.:

Parent Filing Date:

PCT Parent Number:

Parent Filing Date:

LISTING OF US APPLICATIONS CONTINUED ON PAGE 3 HEREOF: ☐ YES ☒ NO

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Customer Number 000530

DIRECT ALL CORRESPONDENCE TO: Customer No. 000530

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name): Takeo MORINAGA

Inventor's signature Takeo Morinaga Date August 31, 2000

Residence: Kanagawa, Japan Citizenship: Japan

Post Office Address: c/o SONY Corporation, 7-35, Kitashinagawa 6-chome, Shinagawa-ku, Tokyo, Japan JP X

Full name of second joint inventor, if any (given name, family name) Ichiro HAMADA

Second Inventor's signature Ichiro Hamada Date August 31, 2000

Residence: Kanagawa, Japan Citizenship: Japan

Post Office Address: c/o SONY Corporation, 7-35, Kitashinagawa 6-chome, Shinagawa-ku, Tokyo, Japan JP X

Full name of third joint inventor, if any (given name, family name):

Third Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

Full name of fourth joint inventor, if any (given name, family name):

Fourth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

Full name of fifth joint inventor (given name, family name):

Fifth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

Full name of sixth joint inventor, if any (given name, family name):

Sixth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

Full name of seventh joint inventor, if any (given name, family name):

Seventh Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

Full name of eighth joint inventor, if any (given name, family name):

Eighth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Post Office Address: _____

☐ Additional inventors are being named on separately numbered sheets attached hereto.

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